California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

Project ID 1 Project I NAEMS: Emission	: Dairy	Completed Estimated Completio Date	
Project Name			
	Monitoring Study (NA	EMS): Air Emissions from Californi	a
Dairies, Part I (NAEMS	S CA5B)		
Project Description			
	issions from livestock of	operations and compile a database	for
		onal consensus for emissions-estim	
methods/procedures f	rom livestock operation	ns.Includes monitoring of VOCs and	d GHG
	ercial dairy using open-	path Fourier transform infrared (OF	P ₋
FTIR) analyzer			
기1	Affiliation PI 1	Fund Source 1	Amount 1
F. Mitloehner	UC Davis	Ag Air Research Council	\$250,000
		(AARC)	
인 2	Affiliation PI 2	Fund Source 2	Amount 2
12	7 thination 1 1 2	r and Course 2	7411041112
의 3	Affiliation PI 3	Fund Source 3	Amount 3
10	7 thination 1 To	Tarra Course o	7.111041110
Report Location			
Report Location			
Interim site data: http:	://www.epa.gov/airqual	ity/agmonitoring/data.html	
Deleted into 4			_
Related info 1			
Polated info 2			
Related info 2			

ate.	l 11

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

	Project Type Dairy Emission	ns	Status	Completed	Estimated Completion Date	May 20	09
Project Name							
	nissions Moni	itorina Stud	v (NAEMS	S): Air Emissions	s from California		
Dairies, Part II (, (
Project Descrip	otion						
Accurately asse	ess emission	s from lives	tock oper	ations and comp	oile a database fo	or	
					missions-estima		
					ng of VOCs and	GHG	
		dairy using o	open-path	Fourier transfo	rm infrared (OP-		
FTIR) analyzer							
PI 1	Δff	filiation PI 1		Fund Source 1		Amo	unt 1
F. Mitloehner		Davis		ARB			40,000
i . Milloerinei		Davio		7.11.12		Ψ	10,000
PI 2	Aff	filiation PI 2		Fund Source 2		Amount 2	
Y. Zhao		C Davis					
PI 3	Aff	filiation PI 3		Fund Source 3		Amo	unt 3
-							
Report Locatio	n						
·							
Interim site dat	ta: http://www	v.epa.gov/ai	rquality/a	gmonitoring/data	a.html		
Related info 1							
Related info 2							

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Typ		Status	Completed	Estimated Completion	May 2009	
3	NAEMS: D Emissions	ally			Date		
	LIIII3310113				Date		
Project Name							
				IS): Air Emissions	from California		
Dairies from	California D	airies, Part	III (NAEMS	CA5B)			
Project Desc	ription						
Accurately as	sess emiss			erations and compi			
				al consensus for er			
				Includes monitorin		SHG	
		ial dairy usii	ng open-pa	th Fourier transfor	m infrared (OP-		
FTIR) analyz	er						
임 1		Affiliation F	11	Fund Source 1		Amount	1
. Mitloehner		UC Davis		CDFA		\$70,	000
기 2		Affiliation F	12	Fund Source 2		Amount	2
∕. Zhao		UC Davis					
기 3		Affiliation F	13	Fund Source 3		Amount	3
Report Loca	tion						
			,				
Interim site o	data: http://v	vww.epa.go	v/airquality/	agmonitoring/data	.html		
Related info	1						
. Jacob IIII							
Related info	2						

California Air Resources Board **Emission Inventory Branch**

	Project Typ	ne	Status	Completed	Estimated	June 2012
Project ID 4	NAEMS: D		Otatas	Completed	Completion	Guile 2012
	Emissions				Date	
Project Name						
			udy (NAEMS	S): Air Emissions	from California	
Dairies, Part	IV (NAEMS	(CA5B)				
Project Desc	ription					
Accurately as	ssess emiss	sions from liv	estock opera	ations and compi	ile a database fo	or
				consensus for en		
				cludes monitoring		
emissions at FTIR) analyz		lai dairy usin	g open-path	Fourier transfori	m infrared (OP-	
Tilt) allaly2	GI					
PI 1		Affiliation Pl	l 1	Fund Source 1		Amount 1
F. Mitloehnei	r	UC Davis		UC Davis, Colleg	ge of Ag and	\$40,000
				Env'al Sciences		
PI 2		Affiliation Pl	I 2	Fund Source 2		Amount 2
Y. Zhao		UC Davis				
PI 3		Affiliation Pl	I 3	Fund Source 3		Amount 3
Report Loca	tion					
Report Loca	tion					
•		vww.epa.gov	/airquality/aو	gmonitoring/data	.html	
•		www.epa.gov	v/airquality/a	gmonitoring/data	.html	
•		www.epa.gov	ı/airquality/a	gmonitoring/data	.html	
•		www.epa.gov	ı/airquality/aږ	gmonitoring/data	.html	
Interim site o	data: http://v	www.epa.gov	v/airquality/a	gmonitoring/data	.html	
•	data: http://v	www.epa.gov	v/airquality/a	gmonitoring/data	.html	
Interim site o	data: http://v	www.epa.gov	v/airquality/a	gmonitoring/data	.html	
Interim site o	data: http://v	www.epa.gov	ı/airquality/a	gmonitoring/data	.html	
Interim site o	data: http://v	www.epa.gov	ı/airquality/a	gmonitoring/data	.html	

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

	ect Type Status		
5 Dairy	/ Emissions	Completic	n
		Date	
Duning t Name			
Project Name	rm Emission Model to Estim	ate Air Emissions from California	0
Dairies, contract 0		ate All Emissions from California	a
Danios, contract of			
Project Description			
		dies, develop a feed/waste strea	m
process-based dai	ry farm emission model for V	OC emissions.	
PI 1	Affiliation PI 1	Fund Source 1	Amount 1
R. Zhang	UC Davis	ARB	\$299,191
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
F. Mitloehner	UC Davis	UC Davis	7411041112
PI 3	Affiliation DL 2	Fund Course 2	Amount 2
A. Goldstein	Affiliation PI 3 UC Berkeley	Fund Source 3 UC Berkeley	Amount 3
A. Goldstelli	OC Berkeley	OC Berkeley	
5			
Report Location			
Related info 1			
http://www.arb.ca	a.gov/research/apr/past/05-34	44.pdf	
Related info 2			
Please provide	e project updates and correct	tions to:	
	Planning and Tachnical Cu		

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

Project ID Project Type	Status	Completed	Estimated	January 2007
6 Dairy Emissions			Completion	
			Date	

Project Name

Dairy Air Quality Monitoring of ROG and Ammonia in the Central Valley of California

Project Description

Maintain staffing and supplies for field and laboratory work to continue the ARB funded ROG project ID 55.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
C. Krauter	CSU Fresno	CSU Agricultural Research Initiative	\$208,000
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
D. Goorahoo	CSU Fresno	ARB	\$104,000
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
B. Goodrich	CSU Fresno	SJVAPCD	\$104,000

Report Location

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_008799.pdf

Related info 1

http://www.epa.gov/ttn/chief/conference/ei15/session6/beene.pdf

Related info 2

http://www.epa.gov/ttn/chief/conference/ei14/session1/goorahoo_pres.pdf

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID Proje	ect Type	Status	Completed	Estimated	December 2008
7 Dair	y Emissions			Completion	
	-			Date	

Project Name

Evaluating Dairy Ammonia, Methane, and Hydrogen Sulfide Emissions Using Tunable Diode Lasers

Project Description

Develop real-time methods for evaluating process and time specific emission profiles for NH3, CH4, and H2S at dairies. A program to monitor ammonia emissions using the USEPA Emission Isolation Flux Chamber began in 2006 and continued through 2008. [No updates since 2006.]

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
D. Goorahoo	CSU Fresno	CSU Agricultural Research Initiative	\$98,000
PI 2 C. Krauter	Affiliation PI 2 CSU Fresno	Fund Source 2 ARB	Amount 2
PI 3 B. Goodrich	Affiliation PI 3 CSU Fresno	Fund Source 3 Boreal Lasers	Amount 3

Report Location

http://www.epa.gov/ttn/chief/conference/ei15/session6/beene.pdf

Related info 1

http://www.4cleanair.org/Documents/APCODetermination.pdf

Related info 2

Abstract on page 9 at this site:

http://www.epa.gov/ttn/chief/conference/ei14/final2005.pdf

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

Project ID	Project Type	Status	Completed	Estimated	May 2009
8	Dairy Emissions			Completion	
	Mitigation			Date	

Project Name

Dairy Operations: An Evaluation and Comparison of Baseline and Potential Mitigation Practices for Emissions Reductions In the San Joaquin Valley (Contract No. 04-343)

Project Description

Project is designed to obtain data needed to better estimate baseline dairy emissions and to estimate the emission reductions achievable with available control technologies.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
C. Krauter	CSU Fresno	ARB	\$250,000
PI 2	Affiliation PI 2	Fund Source 2 possible matching funds - CSUS Fresno Agricultural	Amount 2
D. Goorahoo	CSU Fresno		\$250,000
PI 3 B. Goodrich	Affiliation PI 3 CSU Fresno	Fund Source 3	Amount 3

Report Location

Report - http://www.arb.ca.gov/research/apr/past/04-343.pdf; Abstract http://www.arb.ca.gov/research/abstracts/04-343.htm

Related info 1

http://www.epa.gov/ttn/chief/conference/ei15/session6/beene.pdf

Related info 2

Continuation of previous work

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type	Status	Completed	Estimated	December 2006
9	Dairy Emissions			Completion	
	Mitigation			Date	

Project Name

Air Emission Mitigation Techniques and Technologies for California Dairies

Project Description

Evaluate dairy PM10, 2.5, VOC, and ammonia emission mitigation practices for potential effectiveness. Includes lagoon and corral areas.

PI 1 F. Mitloehner	Affiliation PI 1 UC Davis	Fund Source 1 Merced County via SWRCB and UC matching	Amount 1 \$600,000
PI 2 R. Zhang	Affiliation PI 2 UC Davis	Fund Source 2	Amount 2
PI 3 P. Robinson	Affiliation PI 3 UC Davis	Fund Source 3	Amount 3

Report Location

http://www.arb.ca.gov/ag/caf/FrankMitloehnerDairySymposiumOct06.pdf

Related info 1

Project objective described in PowerPoint at: ftp://ftp.arb.ca.gov/carbis/ag/agadvisory/mitloehner05jan26.pdf

Related info 2

SJVAPCD Aug. 2005 VOC Emission Factors for Dairies, http://www.4cleanair.org/Documents/APCODetermination.pdf

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type	Status	Completed	Estimated	June 2005
10	Dairy VOC Emissions			Completion	
				Date	

Project Name

Volatile Organic Compound (VOC) Emissions from Cows Fed Typical California Rations

Project Description

Measurements of alcohols, volatile fatty acids, phenols, and methane (CH4) emitted from nonlactating (dry) and lactating dairy cows and their manure under controlled conditions. The experiment was conducted in an environmental chamber that simulates commercial concrete-floored freestall cow housing conditions. The fluxes of methanol, ethanol, and CH4 were measured from cows and/or their fresh manure.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
F. Mitloehner	UC Davis	US EPA	\$75,000
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
B. Flocchini	UC Davis		
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
P. Robinson	UC Davis	i dila coalco c	, unodite o

Report Location

Not Available

Related info 1

http://www.4cleanair.org/Documents/APCODetermination.pdf

Related info 2

UCD Dairy Air Quality Symposium presentation 10-11-06 available at: http://www.arb.ca.gov/ag/caf/FrankMitloehnerDairySymposiumOct06.pdf

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

Project ID 11	Project Type Dairy Emissions Mitigation	Status	Completed		Estimated Completion Date	June 2007	
Project Name							
Effects of Liquid Dairy Manure Aeration on Air Quality and Nutrient Cycling							

Project Description

This project will evaluate the air and water emission mitigation effects of a wastewater treatment technology for California dairies to determine whether/to what extent aerobic treatment systems can cost-effectively reduce environmental impacts associated with manure storage.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
C. Collar	UCCE - Kings County	UC ANR	\$30,000
		<u> </u>	
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
F. Mitloehner	UC Davis		
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
J. McGarvey	USDA - ARS	UCCE	

Report Location

Paper is presented in the book, "Dairy Manure Management: Treatment, Handling, and Community Relations". Available for \$42 at: http://www.nraes.org/nra_order.taf?_function=detail&pr_id=48&_UserReference=8429860989D7 67704899E01F

Related info 1		
Related info 2		

California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

	Project Typ		Status	Completed	Estimated	2006
12	Dairy Waste	е			Completion	
					Date	
roject Name						
	on of Dairy	Waste Mar	nagement S	trategies with Rega	rd to Pathoger	ns .
nd Air Quality						
	- (*					
roject Descrip		erobic and	anaerohic tı	reatments have on	the microbiolog	rical
nd chemical p			u			,,,,,
<u>'</u> 'I 1		Affiliation P	1 1	Fund Source 1		Amount 1
. Mitloehner		UC Davis		USDA - ARS		\$30,300
12		Affiliation P	12	Fund Source 2		Amount 2
l. Zhang		UC Davis				
13		Affiliation P	13	Fund Source 3		Amount 3
Report Location	on					
Abstract avail		/rocoarch/p	ublications/r	oublications.htm?SI	=O NO 115-1	05211
ilip.//www.ars	.usua.gov/	research/p	ublications/p	oublications.htm?St	=Q_NO_115=1	95211
Related info 1	1					
Related info 2	2					
Please pro	vide proje	ct updates a	and correction	ons to:		

California Air Resources Board

Emission Inventory Branch Summary of Agricultural Emissions Research in California								
Project ID 13	Project Ty Dairy Emis		Status In progress Estimated Completion Date			September 2	009	
Project Name Estimating and Reducing Air Emissions from Dairy Feeding Operations								
Project Description Identify and measure VOC sources in dairy feed operations								
PI 1 F. Mitloehner		Affiliation F UC Davis	PI 1	Fund Source 1 USDA - CSREE	S	Amount 1 \$278,000)	
PI 2 R. Zhang		Affiliation F UC Davis	PI 2	Fund Source 2 USDA - ARS		Amount 2		
PI 3 C. Krauter		Affiliation F CSU Fresr		Fund Source 3 CSU Fresno		Amount 3		
Report Location Several study presentations, see below; no final report located.								

Related info 1

http://www.ag.iastate.edu/wastemgmt/Mitigation_Conference_proceedings/CD_procee dings/Animal_Housing-Treatment/Calvo-Freestall_housing.pdf

Related info 2

http://www.airquality.nrcs.usda.gov/AAQTF/Documents/200809_201008/200905_Fres noCA/01_Zhang_AAQTF_200905.pdf

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 14 Project Ty Dairy Nuti		Completed	Estimated Completion Date	June 2008
Project Name				
Nutrient Balances in Ca	alifornia Dairy Herds			
Project Description				
Valley, was used to eva	selected dairy farms in aluate the impact of mind terize the mineral comp	erals in drinking wat	er on nutrient	
PI 1	Affiliation PI 1	Fund Source 1		Amount 1
A. Costillo	UCCE Merced	UC ANR		\$40,000
PI 2	Affiliation PI 2	Fund Source 2		Amount 2
F. Mitloehner	UC Davis			
PI 3	Affiliation PI 3	Fund Source 3		Amount 3
D. Bacon	UCCE Tulare			
Report Location				
http://californiaagricultu	ure.ucanr.org/landingpa	ge.cfm?article=ca.v(061n02p90&ab	stract=yes
Related info 1				
Related info 2	ect updates and correct	tions to:		

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type	Status	Completed	Estimated	March 2008
15	Dairy Emissions			Completion	
				Date	

Project Name

Effects of Dietary Rumensin® on GHG and VOC Emissions from Lactating Dairy Cows

Project Description

Feed additives, like monensin sodium (monensin), have been thought to improve cattle health and productivity, and have been used for these reasons for decades. industry is the impact the dairy industry has on the environment. A main environmental concern associated with the dairy industry is the emission of volatile organic compounds (VOC) and greenhouse gases (GHG).

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
F. Mitloehner	UC Davis	Eli Lilly-Elanco	\$50,000
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
E. DePeters	USDA-ARS		
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
J. MacGarvey	USDA - ARS		

Report Location

http://www.extension.org/pages/Environmental_Responses_to_Dietary_Monensin_in_Lactating_ Dairy Cows

Related info 1

Hamilton, S.W., E.J. DePeters, J.A. McGarvey, J. Lathrop, and F.M. Mitloehner. 2010. Greenhouse Gas, Animal Performance, and Bacterial Population Structure Responses to Dietary Monensin Fed to Dairy Cows. J. Environm. Qual. 39:1-9

Related info 2

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12/6/2012

California Air Resources Board

	Sumn	nary of Aç			ventory Brar nissions Res		n Cali	fornia	3
Project ID 16	Project Typ Dairy Air Q		Status		In Progress	Estima Compl Date		May 2	<u>2</u> 010
<mark>Project Name</mark> Western Reg		dor and Air	Quality Edu	ucati	on				
environmenta guarantee the plan to train a of the Wester	nis Profession al impacts o e sustainabi agricultural p rn region, o	f dairy farm lity of the morofessional n the best m	ing in the Wilk and cheels, selected nanagemen	est ese fron t pra	n grant is to red as a way to pro industries. The n around the da actices available s-on workshops	mote and grant red iry produ e to dairy	cipients cing ai produc	reas cers	
PI 1		Affiliation F	YI 1		und Source 1				ount 1
P. Ndegwa		WSU		US	SDA - SARE			,	\$89,000
<mark>PI 2</mark> F. Mittloehner	r	Affiliation F UC Davis	2 1	Fu	und Source 2			Am	ount 2
PI 3 R. Sheffield		Affiliation F Univ. of Ida		Fu	und Source 3			Amo	ount 3
Report Locat	tion								
Related info		NM State (R. Hagevoo	ort) a	and OSU (M. G	amroth)			
Related info	2								

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

Project ID Project Type	Status	Draft Report	Estimated	2010
18 Steer Emission	3		Completion	
			Date	

Project Name

Volatile Organic Compound and Greenhouse Gas Emissions from Growing and Finishing Feedlot Steers and Their Waste

Project Description

To quantify volatile organic compounds (alcohols, volatile fatty acids, amines, and phenols) and greenhouse gas (methane, nitrous oxide, and carbon dioxide) emissions from receiving, growing and finishing feedlot steers (enteric fermentation) and fresh waste using environmental chambers at UC Davis.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
F. Mitloehner	UC Davis	Calfornia Cattlemen Assoc.	\$169,590
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
S. Trabue	USDA - ARS	California Feeder Council	\$0
PI 3	Affiliation DL 2	Fund Course 2	Amaunt 2
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
		ARB/CCOS	\$10,000

Report Location

Report submitted for publication

Related info 1

Costs to be split between the two funding sources

Related info 2

Date:	L.

12/6/2012

California Air Resources Board

Status t Study g Funds Program ect cited at lavis.edu/faculty/Mitloeh Affiliation PI 1 UC Davis	Fund Source 1 UC Davis, Chancellor for	Amount 1 \$140,000
ect cited at lavis.edu/faculty/Mitloeh	Fund Source 1 UC Davis, Chancellor for	
ect cited at lavis.edu/faculty/Mitloeh	Fund Source 1 UC Davis, Chancellor for	
lavis.edu/faculty/Mitloeh Affiliation PI 1	Fund Source 1 UC Davis, Chancellor for	
lavis.edu/faculty/Mitloeh Affiliation PI 1	Fund Source 1 UC Davis, Chancellor for	
	UC Davis, Chancellor for	
UC Davis	UC Davis, Chancellor for	
	Research	
Affiliation PI 2	Fund Source 2	Amount 2
Affiliation PI 3	Fund Source 3	Amount 3
1	Affiliation PI 3	Affiliation PI 3 Fund Source 3 Ect updates and corrections to: ning and Technical Support Division

jspencer@arb.ca.gov 916.324.2717

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID Project Type	
	Februrary 2009
Emissions	•
Project Name	
Covered Lagoon Digester Emission Measurements	
Project Description	
Measurements of NH3, methane, and VOCs at dairies with CEC funded nstallations. Evaluates the Dairy Power Production Program (DPPP). I was initiated to encourage the development of biologically based anaerd and gasification (" iogas") electricity generation projects on California da	The DPPP blic digestion
PI 1 Affiliation PI 1 Fund Source 1	Amount 1
P. Sousa WURD	\$500,000
PI 2 M. Summers Affiliation PI 2 Summers Consulting	Amount 2
M. Summers Consuling	
PI 3 Fund Source 3	Amount 3
Report Location	
http://www.energy.ca.gov/2009publications/CEC-500-2009-009/CEC-50	00-2009-009.PDF
Related info 1	
Troised into 1	
Dalated info 2	
Related info 2	

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 22 Project Tyl Dairy PM, Sources		Completed	Estimated Completion Date	July 2005
Project Name				
Agricultural sources of P	'M10 and ozone precu	rsors		
Project Description				
Compile PM10 and NH3 to ozone formation upwi	emission factors. Mea	asure concentrations airies	of VOC releva	nt to
PI 1	Affiliation PI 1	Fund Source 1		Amount 1
R. Flocchini	UC Davis	USDA		\$374,145
PI 2	Affiliation PI 2	Fund Source 2		Amount 2
C. Parnell	Texas A&M			
PI 3	Affiliation PI 3	Fund Source 3		Amount 3
R. Higashi	UC Davis			
Report Location				
Polated info 1				
Related info 1 http://www.reeis.usda.ç	gov/web/crisprojectpag	jes/192080.html		
Related info 2	ect updates and correc	itions to:		

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

	Project Type Dairy Emissions Modeling	Status	Completed	Estimated Completion Date	June 2007	
Project Name						
Developing a Process Based Model for GHG for California Dairies						

Project Description

Using biological principles and mass balance, develop a cradle-to-grave emissions model to provide greenhouse gas emissions estimates for dairies.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
F. Mitloehner	UC Davis	CEC PIER	\$119,000
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
W. Salas	Applied		
	Geosolutions, LLC		
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
		rulia Source 5	Amount 3
R. Zhang	UC Davis		

Report Location

http://www.arb.ca.gov/research/rsc/2-25-10/feb10adv.pdf

Related info 1

Funded with \$500,000 total - \$119,00 for Mitloehner portion

Related info 2

http://www.westerndairies.org/2009symposium/Mitloehner.pdf

California Air Resources Board

	Sumn	nary of Aç		Emissions Re		lifornia	
Project ID 24	Project Type Ammonia Modeling		Status	<u>Status</u> Completed		2005	
Duning Mana					Date		
<mark>Project Name</mark> Development		ss-Based A	mmonia Mo	odel for Livestock S	Sources		
Project Desc	rintion						
	ocess-base			missions from five	types of animal		
PI 1		Affiliation F		Fund Source 1		Amount 1	
G. Tonnesen		UC Riversi	ae	LADCO		\$250,00	U
PI 2		Affiliation F		Fund Source 2		Amount 2	
Z. Wang		UC Riversi	de				
PI 3		Affiliation F	213	Fund Source 3		Amount 3	
R. Zhang		UC Davis					
Report Loca	tion						
http://www.e	pa.gov/ttncl	nie1/confere	ence/ei14/se	ession1/mansell.po	df		
Related info							
Other resea	rchers - J.	Fadel, R. Zh	nang, G. Ma	ınsell, J. Haasbeek	ζ.		
Related info							
Abstract on	page 9 at: I	nttp://www.e	epa.gov/ttn/d	chief/conference/e	i14/final2005.pd	f	

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 25	Project Typ Dairy Air Q		Status	Completed	Estimated Completion Date	March	2005
Project Desc	t of an Air M QAP) <mark>ription</mark>			e California Dairy	·	ce	
requirements					, po		
PI 1		Affiliation F	1 1	Fund Source 1			ount 1
F. Mitloehner	•	UC Davis		US EPA		1	\$50,000
PI 2		Affiliation F	11 2	Fund Source 2		Amo	ount 2
D. Meyer		UC Davis,		Taria Course 2		7 (11)	Juliu Z
PI 3		Affiliation F	13	Fund Source 3		Amo	ount 3
M. Payne		CDQAP					
Report Loca http://www.c		orts/annual_	_report_2005	i.asp			
	4cleanair.org	g/Documen	s/APCODete	ermination.pdf			
Related info) 2						
Please p	rovide proje	ct updates	and correctio	ns to:			

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type	Status	Completed	Estimated	December 2005
26	Dairy Ammonia			Completion	
	Emissions			Date	

Project Name

Laser-based Sensors for Monitoring Ammonia Emissions

Project Description

A trace-gas sensor based on fibre-amplifier enhanced photoacoustic spectroscopy has been developed for measuring ambient ammonia in agricultural settings. Field testing was performed in environmental chambers at UC Davis where the excreta from three Holstein cows were allowed to accumulate, providing a source of ambient ammonia.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
C. Patel	Pranalytica, Inc.	USDA - SBIR I	\$20,000
PI 2 F. Mitloehner	Affiliation PI 2 UC Davis	Fund Source 2	Amount 2
DI 0	Affiliation DLO	Fund Course 2	Am avest 2
PI 3	Affiliation PI 3	Fund Source 3	Amount 3

Report Location

http://www.pranalytica.com/pdf/MST-16-1547-2005.pdf

Related info 1

\$79,000 total; \$20,000 for Mitloehner portion

Related info 2

Institute of Physics Publishing, Meas. Sci. Technol. 16 (2005) 1547-1553

California Air Resources Board **Emission Inventory Branch**

A trace-gas sensor base has been developed for testing was performed in from three Holstein cows ammonia. PI 1 C. Patel	ed on fibre-amplifier enl measuring ambient am n environmental chamb	Emissions nanced photoacoustic spanonia in agricultural seriers at UC Davis where the mulate, providing a source.	ttings. Field the excreta
Project Description A trace-gas sensor base has been developed for testing was performed in three Holstein cowstammonia. PI 1 C. Patel	ed on fibre-amplifier enl measuring ambient am n environmental chamb	nanced photoacoustic sp nmonia in agricultural set ers at UC Davis where t	ttings. Field the excreta
A trace-gas sensor base has been developed for testing was performed in from three Holstein cows ammonia. PI 1 C. Patel	measuring ambient am n environmental chamb	nmonia in agricultural set ers at UC Davis where t	ttings. Field the excreta
has been developed for testing was performed in from three Holstein cowsammonia. PI 1 C. Patel	measuring ambient am n environmental chamb	nmonia in agricultural set ers at UC Davis where t	ttings. Field the excreta
has been developed for testing was performed ir	measuring ambient am n environmental chamb	nmonia in agricultural set ers at UC Davis where t	ttings. Field the excreta
C. Patel			
C. Patel	Affiliation PI 1	Fund Source 1	Amount 1
	Pranalytica, Inc.	USDA - SBIR II	\$75,000
F. Mitloehner	Affiliation PI 2	Fund Source 2	Amount 2
	UC Davis		
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
Report Location			
http://www.pranalytica.c	com/pdf/MST-16-1547-	2005.pdf	
p.unaiyuda.c	Join/pai/MO1 10 1047	_000.pui	
Related info 1			
\$350,000 (\$75,000 for	Mitloehner portion)		
Delete diefe 0			
Related info 2			

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

	ject Type Study	Status	Completed	July 2005		
Project Name						
	neric Ammonia on	Pig Welfare				
Project Description						
been developed f was performed in	r based on fibre-an for measuring amb environmental cha ere allowed to accu	ient ammonia ambers at UC	a in agricultural se Davis where the	ettings. Field tes excreta from th	sting nree	
PI 1	Affiliation F	기 1	Fund Source 1		Amount 1	
F. Mitloehner	UC Davis		National Pork Board		\$40,000	
PI 2	Affiliation F	인 2	Fund Source 2		Amount 2	
PI 3	Affiliation F	인 3	Fund Source 3		Amount 3	
Report Location http://www.aasv.	org/shap/issues/v1	5n3/v15n3p1	37.pdf			
Related info 1						
Related info 2						
	de project updates					

California Air Resources Board **Emission Inventory Branch**

	Sumn	nary of Ag	ricultural E	missions Re	search in Cal	ifornia
Project ID 29	Project Type Dairies	pe	Status	Completed	Estimated Completion	September 2011
					Date	
Project Name						
Respiratory E	Exposures a	and Health o	f Workers on	California Dairie	s (NIOSH)	
Project Desc	ription					
				arries to dust an y associated wit	d ammonia to do h respiratory	erine
PI 1		Affiliation P	11 F	Fund Source 1		Amount 1
F. Mitloehner		UC Davis	1	NIOSH		\$1,700,000
PI 2		Affiliation P	12	Fund Source 2		Amount 2
M. Schenker		UC Davis				
PI 3		Affiliation P	13 F	Fund Source 3		Amount 3
D. Bennett		UC Davis				
Report Loca	tion					
http://factsre	ports.revue	s.org/492				
Related info	1					
UC Davis' p	orogram - C	A Dairy Envi	ron Health Re	esearch Inititativ	e (Cal-DEHRI)	
Related info	2					
		s, June 2008				

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

	Project Typ		Status	Completed	Estimated	February 2	2006
30	Ozone Imp	acts			Completion		
					Date		
Project Name							
		eric Ozone Ir	npacts of S	elected Pesticide	S		
3.11							
Project Descr	intion						
		imating and o	guantifying o	zone impacts for	selected pestic	ride	
				ently available.	colocioa pootic	,ido	
•				,			
기 1		Affiliation PI	1	Fund Source 1		Amount	1
N. Carter		UC Riverside		ARB		\$100,0	
기 2		Affiliation PI	2	Fund Source 2		Amount	2
. Malkina		UC Riverside				7	
기 3		Affiliation PI	3	Fund Source 3		Amount	3
		, armation i		1 4114 004100 0		711100111	
Report Locat	ion						
Report of Jar	า. 10, 2007	available at:	http://www.a	arb.ca.gov/resear	ch/apr/past/04-	334.pdf	
Related info	1						
Related IIIIO	1						
Related info	2						
INCIALEU IIIIO	_						
Discour		a4a al = 1 = =	- d	1			
Please pr	ovide proje	ct updates ar	nd correction	ns to:			

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 31 Project VOC En		Completed	Estimated Completion Date	August 2008
Project Name				
	VOC Sources and their P	Photochemical Ozone	Formation	
Project Description				
	rstanding of the photoche cide applications in the S		otential of VOCs	S
21.4	Affiliation PI 1	Fund Source 1		Amount 1
PI 1 R. Flocchini	UC Davis	USDA		\$400,000
C. I loccillil	o bavio	00271		ψ 100,000
PI 2	Affiliation PI 2	Fund Source 2		Amount 2
R. Higashi	UC Davis	Fulla Source 2		Amount 2
C. Higasiii	OC Davis			
PI 3	Affiliation PI 3	Fund Source 3		Amount 3
1. Kleeman	UC Davis	I dila Source 3		Amount 3
n. Ricoman	OO Davis			
Report Location http://www.reeis.usda	a.gov/web/crisprojectpage	es/204179.html		
Related info 1 http://airquality.ucda	vis.edu/pages/events/200	08/green_acres/GREE	N.pdf	
Poloted info 2				
Related info 2				
	oject updates and correct			

California Air Resources Board **Emission Inventory Branch**

	Sumr	mary of Ag	gricultural	Emissions Re	search in Ca	lifornia	
Project ID 32	Project Tyle Fumigation		Status	Completed	Estimated Completion Date	2005	
Project Name							
Commerciali	zation of Int	termittent W	ater Sealing	l			
Project Desc	ription						
Identify optim application of			strategies fo	or water sealing co	mmercial-scale		
PI 1		Affiliation P	11	Fund Source 1		Amo	ount 1
D. Sullivan		Sullivan Environme	ntal	USDA			78,000
PI 2		Affiliation P	12	Fund Source 2		Amo	unt 2
H. Ajwa		UC Davis					
PI 3		Affiliation P	13	Fund Source 3		Amo	unt 3
J. Radewald		UC Davis					
Report Loca	tion						
http://www.s	ciencedirec	et.com/sciend	ce/article/pii	/S0045653508003	3913		
Related info		1BAO%2020	005%20pdfs	:/Preplant/8/Sulliva	ın.pdf		
Related info							
Please p	rovide proje	ect updates a	and correcti	ons to:			

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 33 Project Soil An Emisis	nmonia	Status	Completed	Estimated Completion Date	December 2005
Project Name Improved Statewide	Estimates of Ammo	nia Emissio	ons from Native	Soils in Califor	nia
Project Description Develop California s within California	oecific ammonia em	ission facto	ors and modelin	ng for native soi	ls
PI 1	Affiliation PI 1	Fu	und Source 1		Amount 1
C. Krauter	CSU Fresno		RB		\$200,000
PI 2	Affiliation PI 2	Fı	und Source 2		Amount 2
C. Potter	NASA Ames				
PI 3	Affiliation PI 3		und Source 3		Amount 3
S. Klooster	CSU Monterey				
Report Location					
http://www.epa.gov/	ttn/chief/conference/	/ei12/part/k	rauter.pdf (200	3)	
Related info 1					
	gov/sge/casa/regior	nal/california	a.html		
Related info 2					
Please provide n	roject updates and	corrections	to:		

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

	Project ID	Project Type	Status	Completed	Estimated	June 2005
	34	Crop ammonia			Completion	
ı		Emissions			Date	

Project Name

Monitoring of Ammonia Emissions from Crop Production With a Tunable Diode Laser

Project Description

Evaluate the use of a TDL system for the determination of ambient ammonia levels and ammonia emissions from specific agricultural operations.

PI 1	Affiliation PI 1	Fund Source 1 CSU Agricultural Research Initiative	Amount 1
C. Krauter	CSU Fresno		\$296,000
PI 2	Affiliation PI 2 CSU Fresno	Fund Source 2	Amount 2
D. Goorahoo		ARB	\$148,000
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
B. Goodrich	CSU Fresno	Unisearch	\$148,000

Report Location

Partial, 2005 EPA conference. http://www.epa.gov/ttn/chief/conference/ei14/index.html (search Krauter)

Related info 1

http://www.epa.gov/ttn/chief/conference/ei14/session1/goorahoo_pres.pdf

Related info 2

California Air Resources Board **Emission Inventory Branch**

	Sumn	nary of Ag	gricultural	Emissions Re	search in Ca	lifornia		
Project ID 35	Project Typ PM Emissi		Status Drafting Estimated Completion			Dec. 2012		
					Date			
Project Name	9							
Cotton Gin P	M Emission	s Research	, contract 0	9-01PM				
Project Desci								
				ethods which may		er-		
				Sampling Method ended particulates		orizo		
aispersion mo particle size,				ended particulates	(13F). Charact	enze		
particle size,	Shape. Olk i	icai aiica, i	III OA.					
PI 1		Affiliation F	기 1	Fund Source 1		Amo	unt 1	
D. Whitelock ARS - SW (Various cotton industry and		\$147,500			
		Ginning Re	esearch	ginners associa	tions			
PI 2		Affiliation F	기 2	Fund Source 2		Amo	unt 2	
M. Buser		OK State U	Jniv.	ARB		\$4	45,000	
PI 3		Affiliation F	이 3	Fund Source 3		Amo	unt 3	
C. Boykin		Cotton Gin		SJVAPCD			36,000	
•		Research	Unit,					
Report Loca	tion							
Report Loca	tion							
Quarterly rep	orts submit	tted during	research ph	ase				
Related info	1							

Please provide project updates and corrections to: Janet Spencer, Planning and Technical Support Division jspencer@arb.ca.gov 916.324.2717

Related info 2

Date:	1

12/6/2012

California Air Resources Board **Emission Inventory Branch**

Project ID Project Ty PM Emiss		C	stimated ompletion ate
roject Name			
articulate Matter Emis	sions from Raisin H	arvest	
Project Description			<u> </u>
Compare PM emissions ay, dried on vine.	s of raisin harvesting	g techniques: conventional to	ray, continuous
.,,			
임 1	Affiliation PI 1	Fund Source 1	Amount 1
Alex Alexandrou	CSU Fresno	USDA-NRCS	\$0
PI 2	Affiliation PI 2	Fund Course 2	Amount 2
C. Krauter	CSU Fresno	Fund Source 2 SJVAPCD	Amount 2 \$0
J. Madici	000 1 103110	00 V/11 0D	ΨΟ
임 3	Affiliation PI 3	Fund Source 3	Amount 3
S. Ashkan	CSU Fresno		\$0
Report Location			
Related info 1			
Related IIIIO I			
Related info 2			
Related info 2			

jspencer@arb.ca.gov 916.324.2717

late:	1 1

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

	roject Type		Status	Drafting	Estimated	2010
37 E	missions M	/litigation		Reports	Completion	
					Date	
						-
Project Name	i	: DI	- (a ittia ar A arai a ratta	
Practices	ermine Emi	ssions Redu	Ctions Acni	eved by Lower Er	nitting Agricultu	rai
Project Descrip	otion					
Evaluation of co Practices for PI	ontrol effec			CD Conservation ned operations)	Management	
D		Affiliation DI	4	Fund Course 1		Amount 1
PI 1		Affiliation PI	<u> </u>	Fund Source 1 US EPA RARE		Amount 1
US EPA RARE Study				US EFA NAKE		
PI 2	,	Affiliation PI	2	Fund Source 2		Amount 2
				USDA		
PI 3	,	Affiliation PI	3	Fund Source 3		Amount 3
				SJVAPSA		
Report Locatio	on					
Draft report of	Los Banos	work is und	er reivew			
Related info 1						
Related info 2	<u> </u>					
Please prov	vide projec	t updates an	d correction	ns to:		

ate:	12/6/2012
aic.	12/0/2012

California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

Project Description Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent obeing regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1 P. Green Affiliation PI 1 UC Davis Fund Source 1 USDA-CSREES \$0 Affiliation PI 2 Fund Source 2 Amount 2 Affiliation PI 3 Fund Source 3 Amount 3								
Project Name DPR Round-Robin VOC Study Project Description Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1 P. Green Affiliation PI 1 UC Davis Fund Source 1 USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 2 PI 3 Affiliation PI 3 Fund Source 3 Amount 3	Project ID		pe	Status	Completed		October 20	07
Project Name DPR Round-Robin VOC Study Project Description Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1 P. Green Affiliation PI 1 UC Davis Fund Source 1 USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 1 We pure the solvent of the vocation of the solvent of the solvent of the solvent of the vocation of the vocation of the vocation of the solvent of the vocation of the voc	39	VOC						
Project Description Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1 P. Green Affiliation PI 1 UC Davis Fund Source 1 USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 2 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:						Date		
Project Description Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1 P. Green Affiliation PI 1 UC Davis Fund Source 1 USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 2 PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:	Drainat Name							
Project Description Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1 P. Green Affiliation PI 1 UC Davis Fund Source 1 USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 2 PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:			Study					
Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1	DEIX IXOUIIU-I	KODIII VOC	Study					
Determine ways to improve VOC emission estimates for solvents in pesticide formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1								
formulations by comparing the emissions under field conditions to emissions seen in traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1								
traditional TGA testing. Results showed more ozone production on the downwind side, but only slightly. Most of the VOC increase after spraying is NOT from the solvent being regulated but from EtOH in fuel. To decrease ozone, NOx reduction more important than VOC reduction. PI 1 P. Green Affiliation PI 1 UC Davis Fund Source 1 USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 2 PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:								
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Affiliation PI 1 P. Green Affiliation PI 1 UC Davis PI 2 Affiliation PI 2 Fund Source 1 USDA-CSREES \$0 Affiliation PI 2 Fund Source 2 Amount 2 Fund Source 3 Amount 3 Fund Source 3 Amount 3								
P. Green UC Davis USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 2 PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:					·			
P. Green UC Davis USDA-CSREES \$0 PI 2 Affiliation PI 2 Fund Source 2 Amount 2 PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:			A COULT IN THE					
PI 2 Affiliation PI 2 Fund Source 2 Amount 2 PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:								
PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:	P. Green		UC Davis		USDA-CSKEES			ΦΟ
PI 3 Affiliation PI 3 Fund Source 3 Amount 3 Report Location presentation at CDPR, date unknown:								
Report Location presentation at CDPR, date unknown:	PI 2		Affiliation PI	2	Fund Source 2		Amount :	2
Report Location presentation at CDPR, date unknown:								
Report Location presentation at CDPR, date unknown:								
presentation at CDPR, date unknown:	PI 3		Affiliation PI	3	Fund Source 3		Amount	3
presentation at CDPR, date unknown:								
presentation at CDPR, date unknown:								
	Report Locat	tion						
	presentation	at CDPR	date unknowr	·				
					voc regional ozo	one.pdf		
		apaa.ga.,	a c c c , c c , v c	, co, . cop . cj,	. 00 0g.0a0	оо. р ш.		
Related info 1	Related info	1						
Related info 2	Related info	2						
Please provide project updates and corrections to:	Please no	rovide proje	ect undates ar	nd correction	ns to:			

California Air Resources Board **Emission Inventory Branch**

	Summary of A	gricultural E	missions Rese	arch in Cali	fornia
Project ID 40	Project Type Soil VOC Emissions Mititgation	Status	Completed	Estimated Completion Date	December 2009
Project Name					
Reducing Em	nissions of VOCs from	Agricultural So	oil Fumigation, AR	B contract 05-3	351
Project Desc					
ates from la	y plus extension: Devel boratory, field plot and e-scale field experimer	predictive mod	dels which will be d	compared to	ons
기 1	Affiliation I	PI 1	Fund Source 1		Amount 1
Scott Yates	UC Rivers	ide	ARB		\$200,000
기 2	Affiliation I		Fund Source 2		Amount 2
Jay Gan	UC Rivers	ide	USDA-ARS		\$100,000
기 3	Affiliation I		Fund Source 3		Amount 3
M. Majewski	UC Rivers	ide			
Report Loca	tion				
http://www.a	rb.ca.gov/research/apr	/past/05-351.p	odf		
Related info) 1				
ARB agreer	ment 05-351				
Related info) 2				

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 41	Project Typ Dairy & Fed Emissions		Status	Completed	Estimated Completion Date	August 2001
Project Name						
Sources and	Sinks of PM	110 in the Sa	ın Joaquin ∖	/alley		
Project Desci						
Evaluate on-feedlots and		emissions. E	valuate PM	10 and ammonia	a emissions for	
DI 4		Affiliation PI	1	Fund Source 1		Amount 1
PI 1 R. Flocchini		UC Davis	1	USDA		Amount
PI 2		Affiliation PI	2	Fund Source 2		Amount 2
T. Cassel		UC Davis				
PI 3		Affiliation PI	3	Fund Source 3		Amount 3
Report Loca http://www.a		20 00 rob/opr/r	oporto/12020	2 ndf		
nup.//www.a	ib.ca.gov/ie	:searcп/арг/г	eports/12022	z.pui		
Related info	1					
Related info	2					
Please p	rovide proje	ct updates a		ns to: oort Division		

jspencer@arb.ca.gov 916.324.2717

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 42	Project Type Ammonia Emissions	Status	Completed	Estimated Completion Date	June 2001
				Date	
Project Name	9				
Statewide Inv Fertilizers in	ventory Estimates of Al California	mmonia Emiss	sions from Native	Soils and Chen	nical
Project Desc					
	model ammonia emis Report available at: ft				
PI 1	Affiliation	PI 1	Fund Source 1		Amount 1
C. Krauter	CSU Fres		ARB		\$186,425
PI 2	Affiliation	PI 2	Fund Source 2		Amount 2
C. Potter	NASA Am	es	NASA Ames		
PI 3	Affiliation	PI 3	Fund Source 3		Amount 3
S. Klooster	CSU Mon				
Report Loca	tion				
http://geo.ar	c.nasa.gov/sge/casa/c	alifornia.html			
Related info	1				
Related info	2				
Please p	rovide project updates	and correction	ns to:		

California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

	Julilliary Of A	griculturari			IIOIIIIa	
Project ID 43	Project Type Dairy Emissions	Status	Completed	Estimated Completion Date	June 1996	
Project Name Results of the Livestock Wa	Measurement of PM1	0 Precursor	Compounds from	Dairy Industry		
Project Descr	ription					
Jsing enviror	nmental flux chambers	, evaluate dai	ry ammonia and	ROG emissions		
PI 1	Affiliation I		Fund Source 1		Amount 1	
C. Schmidt	Consultan	t	South Coast AQ	MD		
PI 2	Affiliation I	인 2	Fund Source 2		Amount 2	
PI 3	Affiliation I	PI 3	Fund Source 3		Amount 3	
Report Loca	tion					
http://www.e	pa.gov/ttn/chief/confer	ence/ei14/ses	ssion1/schmidt.pc	lf		
Related info	1 qmd.gov/rules/propos	ed/pr1127.htr	ml			
Doloted info	3					
Related info	epa.gov/ttn/chief/confei	rence/ei14/se	ssion1/schmidt.p	df		
Please p	ovide project updates	and correctio	ns to:			

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California Air Resources Board **Emission Inventory Branch**

	Sumn	nary of Ag	ıricultural	Emissions Re	search in Cal	lifornia	
Project ID	Project Typ	ре	Status	Completed	Estimated	January 199	3 5
44	Dairy Emis				Completion		
					Date		
Project Name	e						
		nent of Volat	tile Organic	Compounds from	Livestock Wast	tes	
Project Desc	ription						
		c VOCs fror	n dairies in	the Sacramento r	egion.		
임 1		Affiliation P	YI 1	Fund Source 1		Amount 1	
C. Schmidt		Consultant		US EPA		· · · · · · · · · · · · · · · · · · ·	
기 2		Affiliation P	12	Fund Source 2		Amount 2	
						l	
기 3		Affiliation P	13	Fund Source 3		Amount 3	
						l	
Report Loca	ition						
Related info	o 1						
http://www.	4cleanair.org	g/Document	s/APCODe	termination.pdf			
	·			•			
Related info	2						
Please n	rovide proje	ct undates :	and correcti	ons to:			
				port Division			

jspencer@arb.ca.gov 916.324.2717

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 45	Project Typ Dairy Was Manageme	te	Status	Completed	Estimated Completion Date	January 2002
Project Nam Survey Curre		k Waste Man	agement Pr	actices in the So	uth Coast Air B	asin
<mark>Project Desc</mark> Evaluate ma		gement praction	es in the S	CAQMD		
		, , , , , , , , , , , , , , , , , , ,				
기 1		Affiliation PI		Fund Source 1		Amount 1
∃gigian-Nich	ols	Tetra Tech I	nc	South Coast AQ	MD	
인 2		Affiliation PI	2	Fund Source 2		Amount 2
기 3		Affiliation PI	3	Fund Source 3		Amount 3
Report Loca	ition					
http://www.a	ıqmd.gov/ru	les/support.ht	ml#r1127			
ı						
Related info	o 1					
Related info	2					

jspencer@arb.ca.gov 916.324.2717

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 46	Project Typ Waste Mar		Status	Completed	Estimated Completion Date	March 2003	
Project Name	9						
Literature Su Survey and C				ck Waste Mana	gement Practice	S	
Project Desc							
Literature su http://www.ad	rvey of wast	e manageme es/proposed/	ent and conti pr1127.html	rol options.			
PI 1		Affiliation PI	1	Fund Source 1		Amount 1	
Egigian-Nich	ols	Tetra Tech		South Coast AQ	MD	Amount	
PI 2		Affiliation PI	2	Fund Source 2		Amount 2	
PI 3		Affiliation PI	3	Fund Source 3		Amount 3	
Report Loca	tion						
http://www.a	qmd.gov/rul	es/support.h	tml				
Related info) 1						
Related info	2						
		ct updates a	nd correction				

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Ty	pe	Status	Completed	Estimated	March 20	003
47	Waste Ma	nagement			Completion Date		
					Date		
roject Nam		.,					
				Reducing Ammoland Control Opti			
roject Desc				<u>'</u>			
		es to reduce	emissions.				
		es/proposed/		I			
YI 1		Affiliation PI		Fund Source 1		Amour	nt 1
gigian-Nich	iols	Tetra Tech	Inc	South Coast AC	MD		
12		Affiliation PI	2	Fund Source 2		Amour	nt 2
12		Amiladon i		Turia Godree 2		Amour	11 2
13		Affiliation PI	3	Fund Source 3		Amour	nt 3
Report Loca	ation						
		lles/support.h	tml				
πιρ.//www.a	aqına.gov/ru	iies/support.ri	IUIII				
Related info	o 1						
Related info	n 2						
	-						
Please p	rovide proje	ect updates a ining and Tec	nd correction	ns to:			
jspencer	@arb.ca.go		amicai Supp	OUT DIVISION			
916.324	.2717						

California Air Resources Board **Emission Inventory Branch**

	Summary of Agricultural Emissions Research in California									
	Project Type Waste Management	Status	Completed	Estimated Completion Date	December 2003					
	Particulate Matter and	Ammonia from	n Cattle Feedya	rds and Dairies:	a					
Project Descr Quantify the e	nia Partnership ription effects of water applica n from dry lots housing				d					
PI 1	Affiliation F	PI 1 F	und Source 1		Amount 1					
B. Auvermanr		C	lational Center nd Animal Was		\$12,000					
PI 2 W. Harman	Affiliation F TAMU CE		und Source 2		Amount 2					
PI 3 D. Mever	Affiliation F	PI 3	und Source 3		Amount 3					

D. Meyer	UC Davis	
Report Location		

Related info 1

http://ag.arizona.edu/ANS/swnmc/Proceedings/2006/Auvermann_SWNMC2006.pdf

Related info 2

http://amarillo.tamu.edu/library/files/brent_auvermann_publications/conference_procee dings/preliminaryevaluation_18.pdf

California Air Resources Board **Emission Inventory Branch**

	Sumn	nary of Agr	icultural	Emissions Res	search in Cal	ifornia
	Project Typ		Status	Completed	Estimated	May 2006
49	Dairy Emis	sions			Completion Date	
					Dato	<u> </u>
Project Name		- Fusianiana I	laine Elu	. Oh a mah a ma		
Evaluating Da	iry Process	s Emissions U	ising Fiux	k Chambers		
Project Descri	iption					
				g dairy, evaluate re ush lanes, and cor		
evels of illulyi	iddai pioce	ss including is	agoons, m	usii lailes, allu coi	iais.	
DI 4		Affiliation PI	1	Fund Source 1		Amount 1
PI 1 C. Schmidt		Contractor	1	ARB		Amount 1 \$50,000
o. Commut						*******
PI 2		Affiliation PI	2	Fund Source 2		Amount 2
				SJVAPCD		
DI O		Affiliation DI	0	F		A 1 O
PI 3		Affiliation PI	3	Fund Source 3		Amount 3
Report Locati	ion					
Phase II Tech	h Memo at:	http://www.a	rb.ca.gov/	/ag/caf/SchmidtDa	iryTestData2005	5.pdf
		•	J	J	,	
Related info						
http://www.4	cleanair.or	g/Documents/	/APCODe	termination.pdf		
Related info	2					
		chief/conferer	nce/ei14/s	ession1/schmidt.p	df	

California Air Resources Board **Emission Inventory Branch**

	Sumr	mary of Aç	gricultural	Emissions Res	earch in Cal	ifornia		
Project ID 50	Project Ty Dairy Emis		Status	Completed	Estimated Completion Date	Decen	nber 2005	
Project Nam								
/leasuring D	airy Cow E	missions in a	an Environm	nental Chamber				
Project Desc								
				hamber and evalua resh waste product		oc		
기 1		Affiliation F	¹ 1	Fund Source 1		Amo	ount 1	
. Mitloehne	r	UC Davis		US EPA		\$	575,000	
기 2		Affiliation F	712	Fund Source 2		Amo	ount 2	
R. Flocchini								
기 3		Affiliation F	713	Fund Source 3		Amo	ount 3	
J. Peters								
Report Loca	ntion							
Final Report http://www.a			hnerDairyCh	namberEmissions2	006.pdf			
Related info								
http://www.4cleanair.org/Documents/APCODetermination.pdf								
Related info	2							
J Environ C)ual 37:615	-622 (2008)						

California Air Resources Board **Emission Inventory Branch**

Dairy Emissions Completion Date roject Name olatile Fatty Acids, Amine, and Phenol Emissions from Cows and their Waste roject Description Affiliation PI 1 UC Davis Affiliation PI 2 USDA ARS Fund Source 1 Amount 1 ARB \$200,000 Fund Source 2 Amount 2 Affiliation PI 3 Fund Source 3 Amount 3		Summa	ary of Agı	ricultural	Emissions Re	search in Ca	lifornia	
Affiliation PI 1 UC Davis Affiliation PI 2 USDA ARS Affiliation PI 3 ISU Amount 3 Amou				Status	Completed	Completion	May 200	6
ARB \$200,000 2		Acids, Amine	e, and Pher	nol Emissio	ns from Cows an	d their Waste		
ARB \$200,000 2								
Affiliation PI 2 USDA ARS Affiliation PI 3 ISU Fund Source 2 Amount 2 Amount 3 Fund Source 3 Amount 3 Fund Source 3 Amount 3 Report Location Attp://www.arb.ca.gov/ag/caf/MitloehnerDairyChamberEmissions2006.pdf Related info 1 http://www.4cleanair.org/Documents/APCODetermination.pdf Related info 2 http://jeq.scijournals.org/cgi/content/full/37/2/615	PI 1 Mitloebner			1				
Affiliation PI 3 ISU Report Location Affiliation PI 3 ISU Report Location Affiliation PI 3 ISU Fund Source 3 Amount 3 Report Location Affiliation PI 3 ISU Report Location Amount 3 Report Location Amount 3 Related info 1 Anount 3 Amount 3 Amount 3 Related info 1 Anount 3 Amount 3 Amount 3 Amount 3 Report Location Related info 1 Anount 3 Amount 3 Amount 3 Amount 3 Amount 3 Amount 3 Amount 3 Report Location Related info 1 Anount 3 Amount 3 Amou	. Williocriffer						<u> </u>	.,,,,,,
Report Location Attp://www.arb.ca.gov/ag/caf/MitloehnerDairyChamberEmissions2006.pdf Related info 1 http://www.4cleanair.org/Documents/APCODetermination.pdf Related info 2 http://jeq.scijournals.org/cgi/content/full/37/2/615	PI 2 S. Trabue				Fund Source 2		Amour	nt 2
Related info 1 http://www.4cleanair.org/Documents/APCODetermination.pdf Related info 2 http://jeq.scijournals.org/cgi/content/full/37/2/615	PI 3 J. Koziel			3	Fund Source 3		Amour	nt 3
Related info 1 http://www.4cleanair.org/Documents/APCODetermination.pdf Related info 2 http://jeq.scijournals.org/cgi/content/full/37/2/615	Report Loca	tion						
http://www.4cleanair.org/Documents/APCODetermination.pdf Related info 2 http://jeq.scijournals.org/cgi/content/full/37/2/615	http://www.a	rb.ca.gov/ag/	caf/Mitloeh	nerDairyCh	amberEmissions	:2006.pdf		
http://www.4cleanair.org/Documents/APCODetermination.pdf Related info 2 http://jeq.scijournals.org/cgi/content/full/37/2/615	Related info	1						
http://jeq.scijournals.org/cgi/content/full/37/2/615			Documents	s/APCODet	ermination.pdf			
					_			
Please provide project updates and corrections to:	http://jeq.sc	ijournals.org/d	cgi/content/	/full/37/2/61	5			
	Please p	rovide project	updates a	nd correction	ons to:			

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

		,	,				
Project ID 52	Project Typ Almond Ha Emissions		Status	Completed	Estimated Completion Date	June 2	2004
D 1 (N)							
Project Nam							
mprovemen	t of PM10 ei	mission fact	ors for aimo	ond harvesting			
Project Desc	ription						
Refine existi	ng PM10 em			nd harvesting. Esti	mates based or	1	
measured PI	M10 during a	almond swe	eping and p	ыск ир.			
PI 1		Affiliation F	PI 1	Fund Source 1		Amo	ount 1
R. Flocchini		UC Davis		Almond Board o	f California		
PI 2		Affiliation F	12	Fund Source 2		Amo	ount 2
C. Parnell		Texas A&N	1				
PI 3		Affiliation F	PI 3	Fund Source 3		Amo	ount 3
Report Loca	tion						
http://caaqe	s.tamu.edu/	Publications	:/Publicatior	ns/PU01107.pdf			
Related info	1						
	frymulti.com	/abstract.as	p?aid=2000	39&t=2			
Related info 2							
Please p	rovide proje	ct updates	and correcti	ons to:			

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type	Status	Completed	Estimated	July 2007
53	Dairy VOC Emissions			Completion	
				Date	

Project Name

Photochemical Ozone Formation Potential of Agricultural VOC Sources

Project Description

Some recent estimates predict that dairy cattle are second only to on-road vehicles as a leading source of ozone precursor emissions in California's San Joaquin Valley. The objective of this work was to directly measure the ozone formation potential from dairy housing.

PI 1 P. Green	Affiliation PI 1	Fund Source 1 USDA	Amount 1 \$300,000
PI 2 F. Mitloehner	Affiliation PI 2	Fund Source 2	Amount 2
PI 3 R. Flocchini	Affiliation PI 3	Fund Source 3	Amount 3

Report Location

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VH3-4S0YXTM-2& user=1928924& rdoc=1& fmt=& orig=search& sort=d&view=c& version=1& urlVersion=0& userid=1928924&md5=e020b1203499a23d500c0127b4460438

Related info 1

presentation at CDPR, date unknown:

http://www.cdpr.ca.gov/docs/emon/vocs/vocproj/voc_regional_ozone.pdf

Related info 2

Alternate site for report: Go to http://dx.doi.org and enter "doi:10.1016/j.atmosenv.2008.02.064"

Date:	Г
Date.	

12/6/2012

California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

	er Emissions	Status	Completed	Estimated Completion Date	May 2005
Project Name					
	Emissions in Tunn	el Ventilated	Housing		
Project Description	า				
	0, ammonia and or production cycle in				ring
PI 1	Affiliation P	l 1	Fund Source 1		Amount 1
M. Summers	CDFA		California Poultr	y Federation	\$40,000
PI 2	Affiliation P	12	Fund Source 2		Amount 2
D. Duke	Foster Farn				
PI 3	Affiliation P	13	Fund Source 3		Amount 3
Report Location http://www.arb.ca	.gov/ag/caf/poulem	nisrpt.pdf			
Related info 1					
Related info 2					

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

F	Project ID	Project Type	Status	Completed	Estimated	December 2005
	55	Dairy ROG			Completion	
_		Emissions			Date	

Project Name

Evaluating Dairy Reactive Organic Gas Emissions

Project Description

Chemically speciate ROG samples collected at dairies. Attempt to develop emission factors for dairies and some individually tested dairy processes. Further study continues in 2005-2008 (project IDs 6, 7, 8).

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
C. Krauter	CSU Fresno	ARB	\$100,000
PI 2	Affiliation PI 2	Fund Source 2 CSU Foundation	Amount 2
D. Goorahoo	CSU Fresno		\$20,000
PI 3 B. Goodrich	Affiliation PI 3 CSU Fresno	Fund Source 3	Amount 3

Report Location

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_008799.pdf

Related info 1

http://www.4cleanair.org/Documents/APCODetermination.pdf

Related info 2

http://www.epa.gov/ttn/chief/conference/ei15/session6/beene.pdf

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

	Project ID	Project Type	Status	In progress	Estimated	September 2008
	56	Dairy Waste			Completion	
L		Management			Date	

Project Name

Dairy Wastewater Treatment Feasibility Study

Project Description

Assess the feasibility of applying standard wastewater treatment technology to the management of

manure from cows in typical California dairies. EPA plans to incorporate this information into its on-going

assessment of technologies for dairy manure management.

PI 1 Trygve Lundquist	Affiliation PI 1 Cal-Poly SLO	Fund Source 1 US EPA	Amount 1 \$19,936
PI 2	Affiliation PI 2	Fund Source 2	Amount 2 \$0
PI 3	Affiliation PI 3	Fund Source 3	Amount 3 \$0

Report Location

(When available) http://www.epa.gov/region09/ag/dairy/technologies.html

Related info 1

http://www.arb.ca.gov/ag/caf/dairypnl/dairypanel.htm

Related info 2

http://works.bepress.com/tlundqui/2/

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type	Status	Completed	Estimated	June 2011
57	Soil VOC Emissions			Completion	
Mitigation				Date	

Project Name

Reducing Emissions of VOCs from Agricultural Soil Fumigation: Comparing Emission Estimates from Simplified Methodology, ARB contract 07-332

Project Description

For a single soil, determine the extent to which laboratory and modeling studies can simulate field emission data. Extend the range of emission reduction strategies assessable in the field using the laboratory and modeling approaches. Variables under investigation include columns/furrows, with tarped/untarped, VIF vs. HPDE covered beds/furrows.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
Scott Yates	USDA-ARS-	ARB	\$100,000
	Riverside		
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
Daniel Ashworth	USDA-ARS	DPR	\$50,000
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
			\$0

Report Location

http://www.arb.ca.gov/research/rsc/10-28-11/item4dfr07-332.pdf

Related info 1

ARB agreement 07-332

Related info 2

USDA project 5310-12130-008-05

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12/6/2012

California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

Project ID 58	Project T VOC Em		Status	Draft Report	Estimated Completion Date	Januar	y 2010
Project Name							
Emission of (GHGs Res	sulting from Gre	eenwaste C	omposting			
Project Desc	ription						
methane, hyd flux samples	drogen sul using a is	lfide and moist	ure at the co	onia, nitrate, nitrit ore of the windrov inalyze samples f 's	ws; collect emis		
		Affiliation PI	4	Frond Carriage 4		۸	
PI 1				Fund Source 1		Amo	
Fatih Buyuks	sonmez	UC San Die	go	SJVAPCD		\$19	98,000
PI 2		Affiliation PI	2	Fund Source 2		Amo	unt 2
							\$0
PI 3		Affiliation PI	3	Fund Source 3		Amo	unt 3
							\$0
Report Loca	ition						
Related info	1						
Related info	2						
Janet Sp	encer, Pla @arb.ca.g	iject updates ar anning and Tec gov					

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California Air Resources Board **Emission Inventory Branch**

	Sumn	mary of A	jricultural l	Emissions Re	search in Ca	lifornia	à
Project ID	Project Typ	ре	Status	Completed	Estimated	July 2	2010
59	NAEMS: L				Completion		
	Emissions				Date		
Project Name	Э						
		ssions from	California La	ayer Farms (NAE	MS CA2B)		
Project Desc	ription						
				ement and moni			
					nanically ventilate 000 hens in cage		
					rbon dioxide, vol		
organic comp	oounds, tota	al suspende	d particulates	s, PM2.5 and PM	110. In addition,		
detailed infor	mation and	data are co	llected on ve	ntilation, indoor	and outdoor		
PI 1		Affiliation F	PI 1	Fund Source 1		Am	ount 1
R. Zhang		UC Davis	-			199,000	
- J							
PI 2		Affiliation F	7l 2	Fund Source 2		Am	ount 2
							\$0
기 3		Affiliation F	13	Fund Source 3		Am	ount 3
							\$0
Report Loca	tion						
Interim site of	data: http://v	www.epa.go	v/airquality/a	gmonitoring/data	a.html		
Related info	1						
related lille	-						
Related info	2						
i							

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California Air Resources Board Emission Inventory Branch

Sun	nmary of Agri	cultural E	missions Res	earch in Cal	ifornia	
Project ID 60 Project 1 NAEMS: Emission	Broiler	Status	Completed	Estimated Completion Date	July 2010	
Project Name						
NAEMS Project: Air Ei	missions from C	alifornia Bro	oiler Farms (NAE	MS CA1B)		
Project Description						
This project is for conc emissions from a broil					tod	
proiler barns are meas						
chicken production cyc					ouon	
ulfide, carbon dioxide	, methane, nitro	us oxide, et	hanol, volatile org	ganic compoun		
otal suspended partic	ulates, PM2.5 aı	nd PM10. Ir	n addition, the de	tailed information	on	
PI 1	Affiliation PI	1	Fund Source 1		Amount 1	
R. Zhang	UC Davis		Ag Air Research	Council	\$219,000)
9						
PI 2	Affiliation PI	2 F	Fund Source 2		Amount 2	
					\$0)
PI 3	Affiliation PI	3 F	Fund Source 3		Amount 3	
					\$0)
Report Location				,		
Interim site data: http:	//www epa gov/a	airguality/ag	monitoring/data h	ntml		
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Related info 1						
Delete die C						
Related info 2						

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California Air Resources Board **Emission Inventory Branch**

	Summ	nary of Ag	ricultural	Emissions Re	search in Cal	ifornia	
Project ID 61	Project Typ Dairy N2O		Status	In progress	Estimated Completion Date	February 2	2014
Project Name							
Assessment of Contract 09-3		Nitrous Oxid	le Emission	s in California Da	airy Systems,		
Project Descr							
Stanislaus Co techniques. A of solid manu	ounty. The Nanual N2O Ire, lagoon value the fraction	N2O flux will emissions w water, and sy	be measur vill be calcu vnthetic fert	lated. The annua	sing static chamb Il N inputs in the founted for to enab	form	
기 1		Affiliation P	1	Fund Source 1		Amount	
William Horw	ath	UC Davis		ARB		\$300,0)00
기 2		Affiliation P	2	Fund Source 2		Amount	
				EDF		\$100,0)00
PI 3		Affiliation P	3	Fund Source 3		Amount	
Report Locat	tion						\$0
Nepon Local							
Related info	1						
Related info	2						

Date:	Г
Date.	

12/6/2012

California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

	- Cuiiii		, nountai a				
Project ID 62	Project Typ Soil NOx E		Status	In Progress	Estimated Completion	February 20	014
02	Soil NOX L	-11115510115			Date		
Project Nam	<u> </u>						
Determining	NOx Emiss		oil in Californ	ia Cropping Syst	ems to Improve		
Ozone Mode	ling, Contra	ct 09-329					
Project Desc					: 1 (1120)		
This is an add-on component to the three on-going baseline nitrous oxide (N2O) monitoring efforts. The results of the study are expected to provide an estimate of							
NOx emissions from California's agricultural soils and ozone modeling input by including NOx emissions from the soil. See Project IDs 77, 78, 79, & 81.							
ncluding NO	x emissions	s from the so	oil. See Proje	ect IDs 77, 78, 79	9, & 81.		
PI 1		Affiliation F	11	Fund Source 1		Amount 1	1
William Horv	vath	UC Davis	•	ARB		\$83,50	
기 2		Affiliation F	12	Fund Source 2		Amount 2	
						•	\$0
PI 3		Affiliation F	13	Fund Source 3		Amount 3	3
						;	\$0
Report Loca	ution						
Nepon Loca	illori						
Related info	n 1						
Ttolatou iiii							
Related info	2						
itelateu lille	<i>J</i>						
Please p	rovide proje	ect updates a	and correctio	ns to:			

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

			.				
	Project Typ		Status	In progress	Estimated	May 20	11
63	Ozone Em	ISSIONS			Completion Date		
					Date		
Project Name							
		iogenic Prec	ursors to O	zone and Partic	ulate Matter in the	Э	
Central Valley	, Contract	06-329					
Project Descri	intion						
		on platform fo	or central va	llev agricultural	operations and te	est	
				erosol nucleation			
					n flux measurem	ent	
program for ce	ertain seled	cted crops id	entified duri	ng the screening	g phase.		
기 1		Affiliation P	l 1	Fund Source 1		Amou	ınt 1
Allen Goldstei	in	UC Berkele		ARB			0,003
기 2		Affiliation P	12	Fund Source 2		Amou	ınt 2
John Karlik		UC Berkele		I dila Codico 2		7 111100	\$0
		Extension	,, 5				·
기 3		Affiliation P	I 3	Fund Source 3		Amou	ınt 3
10		Amadon	10	T dria Codrec o		711100	\$0
							**
Report Locati	ion						
ixeport Locati	1011						
Related info	1						
Related info	2						

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 64 Project 7		In Progress Estimated Completion Date	June 2013
Project Name			
	iogenic VOC Emissions E	Estimate Using an Airborne PTR M	15
	ent System, contract 09-3		
Project Description			
		suite of BVOC species, develop n	
		nodology. The results of this project prove the modeling of ozone and	ot
PI 1	Affiliation PI 1	Fund Source 1	Amount 1
Allen Goldstein	UC Berkeley	ARB	\$400,000
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
Alex Guenther	Natl Center Atm Research		\$0
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
Halfidi Jonsson	CIRPAS		\$0
Report Location			
Related info 1			
Related info 2			

California Air Resources Board **Emission Inventory Branch Summary of Agricultural Emissions Research in California**

	Project Type Removing H2S from Biogas	Status	Draft protocol	Estimated Completion Date	December 2010		
Project Name							
Removal of F	12S from Biogas and N	Ox from Engin	e Exhaust at a [Dairy Digester U	sing		

Project Description

Microwave Technology, contract #ICAT 0803

The project will monitor the performance of the H2S removal system and the NOx removal system on the biogas powered engine at the Tollenaar Holsteins Dairy Farm. Anaerobic digester gas (biogas) is captured from a heated, mixed digester and used to fuel a 212 kW Guascor engine-generator. H2S is currently removed from the biogas using an aerated water bubbler system (Soloscrub).

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
Mark Rawson	SMUD	SMUD	\$246,309
기 2	Affiliation PI 2	Fund Source 2	Amount 2
Chang Cha	Cha Corporation		\$0
기 3	Affiliation PI 3	Fund Source 3	Amount 3
Dan Greenberg	Applied Filter Technology		\$0
Report Location			
Related info 1			
Related info 2			
Please provide pro	ject updates and correc	tions to:	

Date:	12/6/2012
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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type		Status	Completed	Estimated	2007
66	Fumigant I	Emissions			Completion	
					Date	
Project Name	j					
		Emissions us	ing Irrigation	on and Virtually Im	npenetrable Film	1
Project Desci	ription					
		Emissions us crin, methyl br		on and Virtually Im	npenetrable Film	
임 1		Affiliation PI	1	Fund Source 1		Amount 1
Steve Fennim	nore	UC Davis		USDA-CSREES		\$0
						·
기 2		Affiliation PI	2	Fund Source 2		Amount 2
Husein Ajwa		UC Davis		Stawberry Comn	nission	\$0
기 3		Affiliation PI	3	Fund Source 3		Amount 3
						\$0
Report Loca	tion					
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http://www.a	gecon.ucda	avis.edu/exten	ision/updat	te/articles/v9n5_3.	.pdf	
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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

						_
Project ID	Project Typ		Status	Completed	Estimated	2006
67	Fumigant E	missions			Completion Date	
					Date	
Project Name)					
Reductions o	f Fumigant	Emissions u	sing Irrigatio	on and Virtually Ir	npenetrable Filn	ns
roject Desci	ription					
Reductions o VIF) for 1,3-l			sing Irrigatio	on and Virtually Ir	npenetrable Filn	ns
ય 1		Affiliation Pl	1	Fund Source 1		Amount 1
homas Trou	ıt	USDA-ARS		T dila Codico i		\$0
1 2		Affiliation Pl	2	Fund Source 2		Amount 2
S. Gao		USDA-ARS				\$0
PI 3		Affiliation Pl	3	Fund Source 3		Amount 3
						\$0
Report Loca	tion					
nttp://www.e	pa.gov/osp/	hstl/AgCon.p	oroceedings	_print.pdf		
Related info	1					
Related info	2					
Please ni	rovide proje	ct updates a	nd correction	ins to:		

Date:	12/6
Date.	12/0/

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 68 Fumigar	Type Status nt Emissions	Completed Estimated Completion Date	2007
Project Name Reductions of Fumiga (VIF)	ant Emissions using Irriga	ation and Virtually Impermeable Filr	ms
	ant Emissions using Irriga opicrin and methyl bromic	ation and Virtually Impermeable Filr de	ms
인 1	Affiliation PI 1	Fund Source 1	Amount 1
Husein Ajwa	UC Davis	UC Davis	\$0
PI 2	Affiliation PI 2	Fund Source 2	Amount 2 \$0
기 3	Affiliation PI 3	Fund Source 3	Amount 3 \$0
Report Location http://www.ars.usda.ç 286	gov/research/publications	s/publications.htm?SEQ_NO_115=	185
Related info 1			
Related info 2			
	oject updates and correct		

jspencer@arb.ca.gov 916.324.2717

	10/0/0010
Date:	12/6/2012

California Air Resources Board **Emission Inventory Branch**

					_			
Project ID	Project Type		Status	Completed		Estimated	2007	,
69	Fumigant Emis	ssions				Completion Date		
						2 410		
roject Name								
eductions o	of Fumigant Em	issions using	, Irrigatio	on				
Project Desc		uminant ami	aciona u	aina tarna, faa.		4.2 D		
valuation of	reductions in fo	umigani emis	ssions u	sing tarps; roct	is on	1,3-D.		
임 1		iliation PI 1		Fund Source	1		An	nount 1
Husein Ajwa	UC	Davis		UC Davis				\$0
기 2	Aff	filiation PI 2		Fund Source 2	2		An	nount 2
								\$0
인 3	Aff	filiation PI 3		Fund Source 3	3		An	nount 3 \$0
								φυ
Report Loca	tion			1				
nttp://mbao.	org/2008/035Aj	wa.pdf						
Related info	1							
Related info	2							
	rovide project u							

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 70 Project T Emission	Status as Modeling	In progress Estimated Completion Date	May 31, 2014
Project Name			
	and implementing proce	ss models for CA agriculture	
	sion estimation, ARB agre		
Project Description			
	mte N2O emissions for C	s to calibrate & valdiate N2O mode CA crop specific fertilizer levels,	els for
PI 1	Affiliation PI 1	Fund Source 1	Amount 1
Changsheng Li	Univ New Hampshire	ARB	\$0
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
William Salas	Applied Geosolutions, LLC		\$0
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
			\$0
Report Location			
Related info 1			
Related info 2			

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California Air Resources Board Emission Inventory Branch

	Sum	mary of Ag		Emissions Res		ifornia	
Project ID 71	Project Ty N2O Emis Mitigation	ssions	Status	In Progress	Estimated Completion Date	March 3	31, 2015
Project Name	<u> </u>						
Evaluating M	itigation O	ptions of Nitro t No. 11-313	ous Oxide E	missions in Califor	nia Cropping		
Project Desc				greatest promise			
N2O emission strategies are sitrification by	ns while me: targeting y using ure	naintaining pr g fertilizer type ease and nitri	oductivity in es and timin fication inhib	lettuce, corn and t g of their application pitors, spatially dec ng irrigation metho	omatoes. Propo on, delaying reasing the		
기 1		Affiliation F	PI 1	Fund Source 1		Amou	ınt 1
/lartin Burge	r	UC Davis		ARB		\$40	0,000
PI 2		Affiliation F	912	Fund Source 2		Amou	ınt 2
							\$0
13		Affiliation F	913	Fund Source 3		Amou	ınt 3
							\$0
Report Loca	tion						
Related info	<u> </u>						

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID Project 72 PM Emis		Completed Estimated Completion Date	September 2011
Project Name			
MISTING: A Viable Co	onservation Management	Practice	
or			
Reducing PM10 Gene	erated by Disking		
Project Description	tiata PM-roducing potentis	al of an existing DCU misting app	aratus
		as other variables such as	aratus
	nof dsut plume, emission f		
임1	Affiliation PI 1	Fund Source 1	Amount 1
Alex Alexandrou	CSU Fresno	USDA-NRCS	\$210,651
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
C. Krauter	CSU Fresno	ARI	\$420,000
임 3	Affiliation PI 3	Fund Source 3	Amount 3
S. Ashkan	CSU Fresno		\$0
Report Location			
http://www.nrcs.usda	.gov/Internet/FSE_DOCU	MENTS/stelprdb1046764.pdf	
Related info 1			
Related info 2			
Please provide pr	oject updates and correct	ions to:	, , , , , , , , , , , , , , , , , , ,

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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

	, ,			
Project ID Project Ty		In Progress	Estimated	2010
73 PM Emiss	ions		Completion Date	
Project Name	th			
pperations	th on particulate matter	emissions from aimo	ond narvest	
Project Description				
Evaluate the effects of s sweeping and pickup op		ulate matter (PM) em	issions from	
PI 1	Affiliation PI 1	Fund Source 1		Amount 1
Brock Faulkner	TAMU			\$0
인 2	Affiliation PI 2	Fund Source 2		Amount 2
S. Capareda	TAMU			\$0
의 3	Affiliation PI 3	Fund Source 3		Amount 3
				\$0
Report Location				
http://www.atmospolres	.com/articles/Volume3/i	ssue2/APR-12-024.p	df	
Related info 1				
Related info 2				
Please provide proje	ect updates and correcti	ons to:		

California Air Resources Board **Emission Inventory Branch**

	Sumn	nary of A	gricultural	Emissions Re	search in Cal	lifornia	ı
Project ID 74	Project Typ PM Emissi		Status	Completed	Estimated Completion Date	2009	
Project Name	е						
nproving PN	M10 Emissio	on Factors f	or Almond S	Sweeping and Har	vesting		
roject Desc	ription						
лроате аппо	na sweepini	g and narve	esung erniss	ion factors using c	nspersion mode	ling	
PI 1		Affiliation F	인 1	Fund Source 1		Am	ount 1
Brock Faulkn	ner	TAMU		Almond Bd of C	A		\$0
PI 2		Affiliation F	인 2	Fund Source 2		Am	ount 2
3. Goodrich		Trinity Consultants				\$0	
913		Affiliation F	인 3	Fund Source 3		Ame	ount 3
. Capareda		TAMU					\$0
Report Loca	tion						
Proprietary,	Almond Boa	ard of CA					
Related info	1						
		/Papers/Aln	nond/Annua	IReport2010.pdf			
Related info	2						
Please p	rovide proje	ct updates	and correcti	ons to:			

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ate:	Ш	

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID Project Type			
75 PM Emissi	ons	Comp	letion
		Date	
Dunia at Nama			
Project Name	ion factors for almond h	narvest as a function of harv	voctor
speed	ion factors for aminoria i	iaivest as a function of flarv	ester
Project Description			
		reducign harvester ground	
Tom 3 mpn to 2.3 mpn u	ISIGITI ISCOTS AND ALIX	MOD to back calculate emis	ision rates
기 1	Affiliation PI 1	Fund Source 1	Amount 1
Brock Faulkner	TAMU		\$0
인 2	Affiliation PI 2	Fund Source 2	Amount 2
B. Goodrich	Trinity Consultants	T dila Godico L	\$0
의 3	Affiliation PI 3	Fund Source 3	Amount 3
V. Botlaguduru	TAMU		\$0
Report Location Abstract: http://www.tan	dfonline.com/doi/abs/1	0.3155/1047-3289.59.8.943	
Related info 1			
Related info 2			
Please provide proje	ect updates and correcti	ions to:	

Date:	1	

12/6/2012

California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

Project ID	Project Typ	Δ	Status	Completed	Estimated	2011
76	PM Emission		Status	Completed	Completion	2011
] =				Date	
roject Nam		<u> </u>		A1 111		
arvesting E	-quipment to	Reduce PN	/I Emissions fi	rom Almond Ha	rvest Operations	
roject Desc	cription					
			nd harvesting	systems and re	trofit abatement	
levices to e conventiona	missions fror	n a				
Onventiona	i ilai vestei					
임 1		Affiliation P	01.1	Fund Source 1		Amount 1
Brock Faulk	ner	TAMU		JSDA-NRCS		\$0
DIOCK I AUIK	1161	17 1110		3027111100		Ψ.
기 2		Affiliation P	12	Fund Source 2		Amount 2
				SJVAPCD		\$0
기 3		Affiliation P	13	Fund Source 3		Amount 3
						\$0
Report Loca	ation					
Not availab	<u></u> <u></u>					
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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID Project Type	Status	In Progress	Estimated	2012
77 N2O Emissions			Completion	
			Date	

Project Name

Fertilizer N2O Research, Assessment of Baseline Nitrous Oxide and Nitric Oxide Emissions in California Cropping Systems, ARB Contract No. 08-324)

Project Description

Researchers are coordinating study goals and methods on 4 separate studies to evaluate flux emissions of N2O using typical fertilizer practices for each crop. Work began in June 2009. Measuring nitrous oxide flux in tomato, wheat, lettuce, rice, vineyard, orchard and alfalfa systems to develop emission factors. See also Project IDs 62, 78, 79 & 81.

PI 1	Affiliation PI 1	Fund Source 1	Amount 1
William Horwath	UC Davis	ARB	\$300,000
PI 2	Affiliation PI 2	Fund Source 2	Amount 2
J. Six	UC Davis (CEC	CEC (+ \$25K match)	\$500,000
	Funded)		
PI 3	Affiliation PI 3	Fund Source 3	Amount 3
D. Goorahoo	CSU Fresno (CDFA	CDFA	\$150,000
	Funded)		

Report Location

4-14-12: Draft Final Report: http://www.arb.ca.gov/research/rsc/05-11-12/item4dfr08-324.pdf

Related info 1

See Project ID 62, contract 09-329, which is an add-on to study nitric acid

Related info 2

Date:	12/6/2012
Date.	12/0/2012

California Air Resources Board Emission Inventory Branch tummary of Agricultural Emissions Research in California

	Sumn	nary of Ag	ricultural	Emissions Res	search in Cai	ifornia	
Project ID	Project Typ	ре	Status	In Progress	Estimated	2013	
	Soil NOx E				Completion		
					Date		
Project Name							
				ne Nitrous Oxide a	nd Nitric Oxide		
Emissions in (California C	Cropping Sys	stems (CEC	Contract)			
Project Descr	ription						
Researchers	are coordin			ethods on 4 sepa			
				ilizer practices for			
				ux in tomato, whe			
		talta system	s to develop	emission factors.	See also Proje	ct	
IDs 62, 77, 79	1 α δΊ.						
PI 1		Affiliation P	11	Fund Source 1		Amou	ınt 1
Johan Six							\$0
PI 2		Affiliation P	12	Fund Source 2		Amou	ınt 2
- · ·							\$0
PI 3		Affiliation P	13	Fund Source 3		Amou	int 3
							\$0
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Related info	1						
Related info	2						
Please nr	ovide proje	act undates a	and correction	one to:			

California Air Resources Board
Emission Inventory Branch
Summary of Agricultural Emissions Research in California

		, ,					
Project ID 79	Project Typ Soil NOx E		Status	In Progress	Estimated Completion Date	Dec. 31, 201	3
					Date		
Project Name)						
Measuring ar Cropping Sys			de Emission	s from California	Cotton and Tom	nato	
Project Descr	ription						
evaluate flux began in Jun	emissions o e 2009. Me hard and alf	of N2O using easuring nitr	typical ferti ous oxide flu	ethods on 4 sepa lizer practices for ux in tomato, whe emission factors.	each crop. Wor at, lettuce, rice,		
DI 4		Affiliation P	I 1	Fund Source 1		Amount 1	
PI 1 Dave Goorah	100	Allillation	1 1	i una Source i		\$()
Dave Gooran							
PI 2		Affiliation P	12	Fund Source 2		Amount 2	
						\$0)
PI 3		Affiliation P	13	Fund Source 3		Amount 3	
						\$0)
Report Loca	tion						
Related info	. 1						
Related IIIIO	, <u>I</u>						
Related info	2						

California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID	Project Type	Status	In Progress	Estimated	2015
80	Dairy Emissions			Completion	
	Mitigation			Date	

Project Name

Quantification of the Emission Reduction Benefits of Mitigation Strategies for Dairy Silage, ARB Contract No. 11-325

Project Description

Silage emissions include criteria pollutants (e.g. VOCs, NOx) and greenhouse gases. This project aims to quantify and model the effectiveness of various mitigation practices (such as maintaining a smooth pile face, storing silage in ag bags, etc.) on the various emissions species. Factors such as silage exposure surface area, temperature, air velocity, etc. will also be measured and analyzed.

PI 1 F. Mitloehner	Affiliation PI 1 UC Davis	Fund Source 1 ARB	Amount 1 \$400,000
PI 2 Y. Zhao	Affiliation PI 2 UC Davis	Fund Source 2	Amount 2 \$0
PI 3 P. Green	Affiliation PI 3 UC Davis	Fund Source 3	Amount 3 \$0

rtoport Location		

Related info 1

Report Location

Atmospheric Environment. 2010, 44:1989-1995; Atmospheric Environment. 2010, 44: 4172-4180; J. Environ. Qual. 2011, 40:1-9, Env. Sci. & Technol. 2010, 44: 2309-2314; Trans. ASABE. 2011, 53: 1-7

Related info 2

Date:	12/6/2012
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California Air Resources Board Emission Inventory Branch Summary of Agricultural Emissions Research in California

Sui	minary or Ag	griculturai	Emissions Res	search in Ca	iliornia	
Project ID 81 Soil NO	Type x Emissions	Status	In Progress	Estimated Completion Date	Dec. 31, 201	5
Project Name					_	
Assessment of Basel				Range of Nitro	gen	
Fertilizer Application I	Rates in Corn S	Systems (CE	DFA Contract)			
Project Description						
Researchers are coolevaluate flux emission began in June 2009. vineyard, orchard and IDs 62, 77, 78 & 79.	ns of N2O usin Measuring nit	g typical fert rous oxide f	tilizer practices for lux in tomato, whe	each crop. Wo		
PI 1	Affiliation F	PI 1	Fund Source 1		Amount 1	
Martin Burger	UC Davis		CDFA		\$92,54	2
PI 2	Affiliation F	PI 2	Fund Source 2		Amount 2	
W. Horwath	UC Davis					0
PI 3	Affiliation F	Affiliation PI 3		Fund Source 3		
					\$	0
Report Location						
Related info 1						
Related info 2						
TOTALOG ITIO Z						

California Air Resources Board Emission Inventory Branch

Project ID	Project Ty		Status	Completed	Estimated	March 2012
82	Soil Nox E	missions			Completion	
<u> </u>	Mitigation				Date	
roject Nam	е					
			policy to mi	tigate nitrous oxid	e (N2O) emissio	ons
om Califorr	nia Agricultu	re				
Project Desc	cription					
21.4		Affiliation F	01.1	Fund Source 1		Amount 1
<mark>PI 1</mark> Iohan Six		UC Davis	11	Packard Founda	ation	\$0
onan oix						**
인 2		Affiliation F	12	Fund Source 2		Amount 2
Л. Burger		UC Davis				\$350,000
ગ ૩		Affiliation F	13	Fund Source 3		Amount 3
V. Horwath		UC Davis				\$0
Report Loca	ation					
Related info		00	/ /050 /	-00 0000 000 PD	-	
	jy.ca.gov/20	ospublicatio	ns//CEC-:	000-2008-039.PDI	Γ	
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California Air Resources Board **Emission Inventory Branch** Summary of Agricultural Emissions Research in California

Project ID 83	Project Typ Soil Nox E Mitigation		Status	In Progress	Estimated Completion Date	June 20	13
Project Name							
Use of Waln		improve so	il properties	and			
reduce N2O							
Project Desc		nating the inf	luonoo of bir	ochar on the coil N	l avala and earh	000	
				aluates biochar fro			
applied to the				aluates blochar inc	iii walilut Silelis		
applied to the	waiiiuts oi	cilaius as cc	mpost.				
PI 1		Affiliation P	I 1	Fund Source 1		Amou	nt 1
Johan Six		UC Davis		CEC			4,834
oonan oix						•	,
DI O		A ((')' (' D	1.0	E 10 0		Δ.	1.0
PI 2		Affiliation P	12	Fund Source 2		Amou	
							\$0
PI 3		Affiliation P	13	Fund Source 3		Amou	nt 3
							\$0
Report Loca	tion						
Report Loca	uon						
Preliminary:	http://www.	plantscience	s.ucdavis.e	du/Agroecology/O	utreach/Walnut	.html	
		p.a					
Related info	1 1						
related lift	<i>7</i> I						
Related info	2						

ate:	12/6/2012

California Air Resources Board

Project ID Project	Гуре	Status In Progres		Feb. 2014
84 Soil Nox	Emissions		Completion Date	
			Date	
roject Name				
Deleted				
roject Description Deleted				
Jeleted				
				Amount 1
N	Affiliation PI 1 UC Davis	Fund Source ARB	Fund Source 1	
Villiam Horwath	UC Davis	AND		\$83,500
PI 2	Affiliation PI 2	Fund Source	2	Amount 2
1. Burger	UC Davis	T dila codio	<u> </u>	\$0
13	Affiliation PI 3	Fund Source	e 3	Amount 3
				\$0
Report Location				
Description: http://ww	w.arb.ca.gov/rese	earch/single-project.ph	p?row_id=64853	
Related info 1				
Related info 2				
Related info 2				

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